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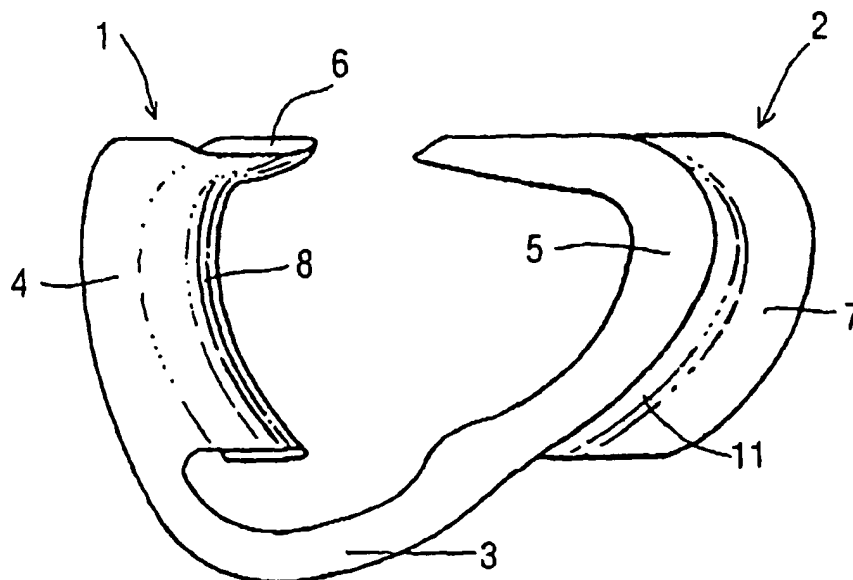
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(54) Title: LIP RETRACTOR



(57) Abstract: The present invention relates to an improved construction of a lip retractor, for holding open a person's lips, of a type comprising two arcuate shells, for engaging the lips and mouth corners, integrally connected by a spring arm. The retractor is particularly for assisting in the application of cosmetic treatments to the front teeth. The shells have a small radius of curvature where they fit the mouth corners and provide for greater comfort than prior art devices. The retractor is also bent so that the two shells are at an angle to each other to approximate the mouth shape and provide for yet further improvement in comfort.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

LIP RETRACTOR

Field of the Invention

The present invention relates to a lip retractor used for holding the lips open to facilitate first person treatment of the teeth, especially the front teeth, in a convenient and comfortable manner.

Background Of The Invention

There is a growing demand for people to be able to treat their own teeth, for example with tooth whitening products, beyond the traditional brushing with a cleansing product. In some cases, it is desirable for a person treating their teeth to be able to hold his or her mouth open for a substantial period, for example to permit the drying of an applied film. Holding one's mouth open without some assistance can lead to muscular cramps and to increased production of saliva, which may impede the treatment. Using one's fingers to hold the lips open to the desired degree not only requires some dexterity but uses up a hand which may be needed for applying a treatment product or holding a mirror.

Of course the need to hold the mouth open during a treatment of the teeth is a problem that has long been faced by dentists. Numerous devices have been provided for that purpose over the years. Typically though, a dentist's need is to be able to get to the inside of the teeth as well as the outside, requiring the mouth to be held open to a greater extent. The device of US 4,200,089, for example, has lip-engaging hook structures which spread the lips wide in order to provide a large 'access window'. Whilst the discomfort this may cause may be acceptable within the context of a therapeutic treatment in a dental surgery, it is greater than would be broadly tolerated by those simply looking for assistance in providing a home cosmetic treatment. Further, devices for a dentist's use may be too elaborate, providing for auxiliary functions such as control of the tongue or saliva removal. US Patent Nos. 3,916,880, and 4,002,162 fall into this category. For a cosmetic treatment which may only be required on the outside surfaces of the front teeth,

only the lips need to be held back, without the teeth of the upper and lower jaws necessarily being separated. Auxiliary functions are unnecessary.

It is an object of the present invention, therefore, to provide a device for holding back the lips which is more comfortable to use than known devices.

- 5 It is a further object of the present invention to provide a device which is capable of allowing access of a brush to the whole of a user's front teeth without interference with the user's lips but without undue stretching of the lips.

It is yet a further object of the present invention to provide a device which is economical to manufacture.

- 10 The present inventors have found that, by a novel design of lip retractor, the comfort and appearance of a person during a cosmetic treatment of the teeth can be substantially improved, whilst retaining the convenience aspect of using lip retractors to hold the lips open.

- These and other objectives will become readily apparent from the detailed description
15 which follows.

Summary Of The Invention

- The present invention provides an improved construction of a lip retractor, for holding open a person's lips, comprising, in a first aspect first and second arcuate shells arranged in opposed relation to each other and integrally connected by an arcuate spring arm
20 connected to the lower parts of the shells and extending downwardly and positioned outside the mouth when the shells are in place, each of the first and second arcuate shells having:

- a) a trough-shaped cross-section, including front and back side walls designed to engage the lips and cheeks at the person's mouth corners; and
- 25 b) inner and outer opposed surfaces extending between the front and back side walls, the outer surface being in contact with the person's lips and cheeks during use, the curve formed by the intersection of the inner surface with a plane bisecting the shell

between the front and back side walls having a radius of curvature of less than 10 mm.

In a second aspect the invention provides a lip retractor having a front and a back, comprising first and second arcuate shells arranged in opposed relation to each other and integrally connected by an arcuate spring arm connected to the lower parts of the shells and extending downwardly and positioned outside the mouth when the shells are in place, each of the first and second arcuate shells having:

- a) a trough-shaped cross-section, including front and back side walls designed to engage the lips and cheeks at the person's mouth corners,
- 10 b) inner and outer opposed surfaces extending between the front and back side walls, the outer surface being in contact with the person's lips and cheeks during use;

the inner surfaces of the shells, when viewed from the front, bounding a flattened ellipse, characterised in that the height of the flattened ellipse at a distance 10% inwards of its leftmost extent is less than 70% of its maximum height.

15 In a third aspect the invention provides a lip retractor, for holding open a person's lips, having a front and a back, comprising first and second arcuate shells arranged in opposed relation to each other and integrally connected by an arcuate spring arm connected to the lower parts of the shells and extending downwardly and positioned outside the mouth when the shells are in place, each of the first and second arcuate shells having:

- 20 a) a trough-shaped cross-section, including front and back side walls designed to engage the lips and cheeks at the person's mouth corners,
- b) inner and outer opposed surfaces extending between the front and back side walls, the outer surface being in contact with the person's lips and cheeks during use;

characterised in that the planes bisecting the first and second shells between their front and back side walls intersect at an acute angle of at least 20°.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a lip retractor in an embodiment of this invention;

FIG. 2 is a front view thereof;

FIG. 3 is a bottom view thereof;

Description of preferred embodiment

The present invention is now described in detail by way of an embodiment thereof with
5 reference to the accompanying drawings.

The lip retractor, which is generally symmetrical in reflection between left and right halves (see Figure 2), includes a pair of arcuate shells 1 and 2 adapted to fit to the lips and mouth corners and to hold them back from the front teeth. The shells are integrally
10 connected by an arcuate spring arm 3 connected to the lower parts of the shells which extends downwardly and is positioned outside of the mouth, in front of the lower lip, when the shells are in place. The whole lip retractor is preferably made out of a soft, food contact approved (FDA) grade of plastic by injection moulding. Suitable plastics include polypropylene, polyethylene, nylon, polyacetal, and polycarbonate. Preferred are polypropylene and polyethylene. A suitable polypropylene is Eltex™ KW276 PP from
15 Solvay Plastics.

The spring arm 3 is of a thickness such that the lip retractor has sufficient resilient strength to hold the lips back, whilst allowing it to be bent for easier insertion whilst fitting it into place. In the drawings the spring arm has a generally rectangular cross-section. However, this is not critical and the cross-section can be round or oval, such
20 cross-sections assisting in adjusting the resilience. Preferably the spring arm is non-planar such that the first and second arcuate shells do not lie in a common plane, as best seen in Figure 3. Specifically, in the embodiment shown, the planes bisecting the first and second shells between their front and back side walls, shown in Figure 3 by lines B-B and C-C intersect at an angle of about 38°. More generally, the intersection angle θ is at
25 least 20°, preferably at least 25°, more preferably at least 30°. This angling of the first shell with respect to the second reflects the shape of the mouth and provides for a comfortable fit in use.

Each shell has a trough-shaped cross-section, including front side walls 4, 5 and back side walls 6, 7 designed to engage the lips and cheeks at the person's mouth corners. As best seen in Figure 3, the front and back side walls diverge slightly from each other in the direction of the connecting spring arm. This allows more space for the lips where they are fullest near the centre of the mouth than at the mouth corners where the lips are narrower. This also provides a more comfortable fit. The back side walls extend further from the base of the trough of the shells than do the front side walls.

The shells 1,2 further comprise inner 8, 9 and outer 10, 11 opposed surfaces extending between the front and back side walls. It is the outer surfaces that are in contact with the person's lips and cheeks during use. The inner surfaces of the shells, when viewed from the front, as in Figure 2, bound an almost semi-circular flattened ellipse (completed by the dashed lines in Figure 2), approximating the smile-shaped access window to the teeth afforded by the retractor in use. In the embodiment shown, the ellipse has a width, at its widest point along the line A-A of about 70 mm. This distance is generally dimensioned for the adult human mouth and can be adjusted as necessary. The ellipse has a maximum height, at its centre, of about 28mm, sufficient comfortably to expose the front teeth whilst the teeth of the upper and lower jaw are held together. To do this, it is not necessary to stretch the mouth unduly at the corners and the inside corners of the retractor have a relatively small radius of curvature, at the point R in Figure 2. The radius of curvature is measured on the curve formed by the intersection of the inner surface 8 of the shell with the plane bisecting the shell between the front 4 and back 6 side walls (numerals refer to the left-hand shell 1 but it will be clear that an analogous measurement can be made on the right hand shell 2). The radius of curvature is less than 10 mm, preferably less than 7 mm, and more preferably less than about 4 mm. This results in the height of the flattened ellipse bounded by the inner surface increasing in height relatively slowly compared to prior art devices. At a distance 10% inwards of its leftmost extent the ellipse is less than 70%, preferably less than 65% of its maximum height.

In use, the lip retractor of this invention is fitted into the mouth by bending the arcuate shells 1 and 2 towards each other and then positioning the shells in the mouth engaging

the trough shaped inner surfaces outer surfaces 10, 11 inside the mouth corners so that front walls 4, 5 lie outside of the lips and back walls 6, 7 lie inside of the lips. The front teeth are then revealed without the retractor needing to be held so that both hands are free for applying a cosmetic treatment such as painting on a tooth whitening composition.

- 5 The retractor of this invention may be provided as part of a kit which includes the retractor, a treatment composition, preferably a tooth whitening composition, and an applicator for the composition, such as a brush, optionally together with instructions for use. The treatment composition can be purely cosmetic or it can be a therapeutic composition, such as a remineralising composition for strengthening the tooth enamel.
- 10 Exemplary cosmetic treatments, in particular tooth whitening compositions, are provided in co-pending PCT application PCT/US00/15891, incorporated herein by reference.

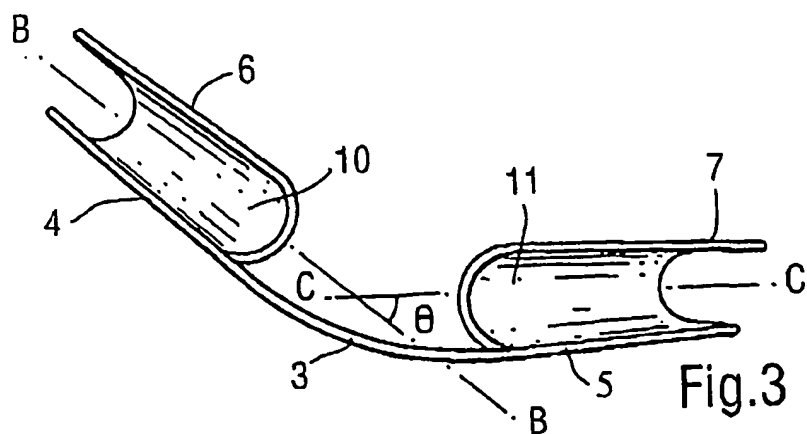
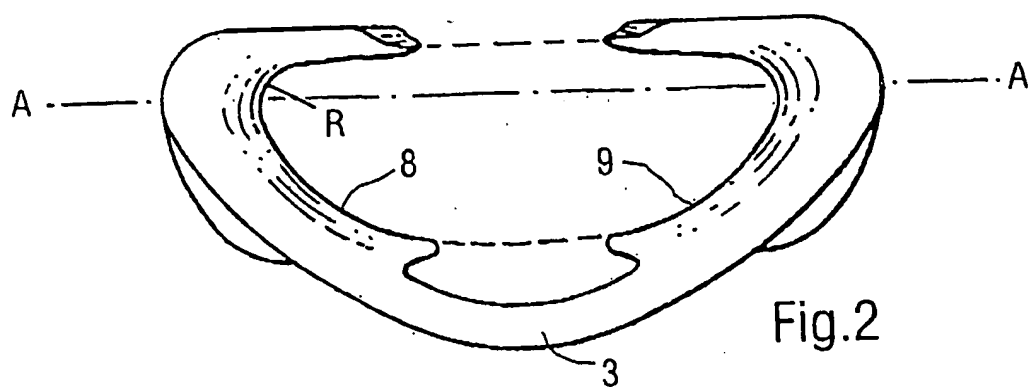
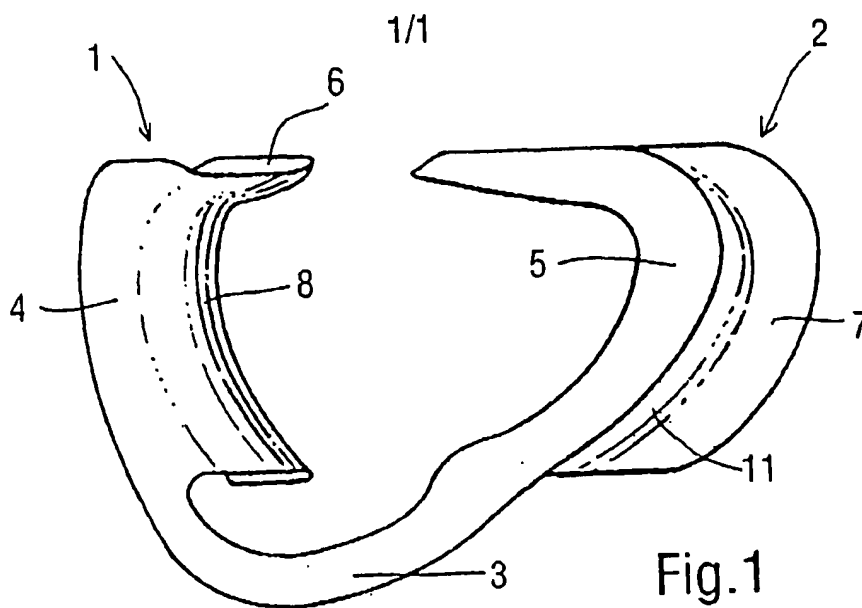
- Since the invention disclosed herein may be embodied in other specific forms without departing from the general characteristics, the embodiment described herein is, therefore, to be considered in all respects as merely illustrative, the scope of the invention being
- 15 indicated by the appended claims, rather than by the foregoing description; and all embodiments which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

WHAT IS CLAIMED IS:

1. A lip retractor, for holding open a person's lips, comprising first and second arcuate shells arranged in opposed relation to each other and integrally connected by an arcuate spring arm connected to the lower parts of the shells and extending downwardly and positioned outside the mouth when the shells are in place, each of the first and second arcuate shells having:
 - a) a trough-shaped cross-section, including front and back side walls designed to engage the lips and cheeks at the person's mouth corners; and
 - b) inner and outer opposed surfaces extending between the front and back side walls, the outer surface being in contact with the person's lips and cheeks during use, the curve formed by the intersection of the inner surface with a plane bisecting the shell between the front and back side walls having a radius of curvature of less than 10 mm.
2. A lip retractor, for holding open a person's lips, having a front and a back, comprising first and second arcuate shells arranged in opposed relation to each other and integrally connected by an arcuate spring arm connected to the lower parts of the shells and extending downwardly and positioned outside the mouth when the shells are in place, each of the first and second arcuate shells having:
 - a) a trough-shaped cross-section, including front and back side walls designed to engage the lips and cheeks at the person's mouth corners,
 - b) inner and outer opposed surfaces extending between the front and back side walls, the outer surface being in contact with the person's lips and cheeks during use;

the inner surfaces of the shells, when viewed from the front, bounding a flattened ellipse, characterised in that the height of the flattened ellipse at a distance 10% inwards of its leftmost extent is less than 70% of its maximum height.

3. A lip retractor according to Claim 1 or Claim 2 wherein the arcuate spring arm is non-planar such that the first and second arcuate shells do not lie in a common plane.
4. A lip retractor according to Claim 3 wherein the planes bisecting the first and second shells between their front and back side walls intersect at an acute angle of at least 20°, preferably at least 25°, more preferably at least 30°.
5. A lip retractor, for holding open a person's lips, having a front and a back, comprising first and second arcuate shells arranged in opposed relation to each other and integrally connected by an arcuate spring arm connected to the lower parts of the shells and extending downwardly and positioned outside the mouth when the shells are in place, each of the first and second arcuate shells having:
 - a) a trough-shaped cross-section, including front and back side walls designed to engage the lips and cheeks at the person's mouth corners,
 - b) inner and outer opposed surfaces extending between the front and back side walls, the outer surface being in contact with the person's lips and cheeks during use;characterised in that the planes bisecting the first and second shells between their front and back side walls intersect at an acute angle of at least 20°.
6. A kit comprising a retractor according to any of the preceding claims, a treatment composition and an applicator to apply the composition to the teeth.
7. A kit according to Claim 6 wherein the treatment composition is a tooth whitening composition.
8. A method of applying a treatment to the front teeth comprising holding back the lips with a retractor according to any of claims 1 to 5 and then applying a treatment composition to the front teeth.
9. A method according to Claim 8 wherein the treatment composition is a tooth whitening composition.



INTERNATIONAL SEARCH REPORT

Int. Application No.

PCT/US 01/22787

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61C5/14 A61B1/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61C A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 889 490 A (JENKINSON JEFFREY A) 26 December 1989 (1989-12-26) column 2, line 64 -column 3, line 23 figure 3	2
Y		3-9
A		1
Y	----- PATENT ABSTRACTS OF JAPAN vol. 1998, no. 09, 31 July 1998 (1998-07-31) -& JP 10 108834 A (AKIHIRO TAKASHI), 28 April 1998 (1998-04-28) paragraph '0015! abstract	3-5
A	----- -/--	1



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

In Application No

PCT/US 01/22787

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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PCT/US 01/22787

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